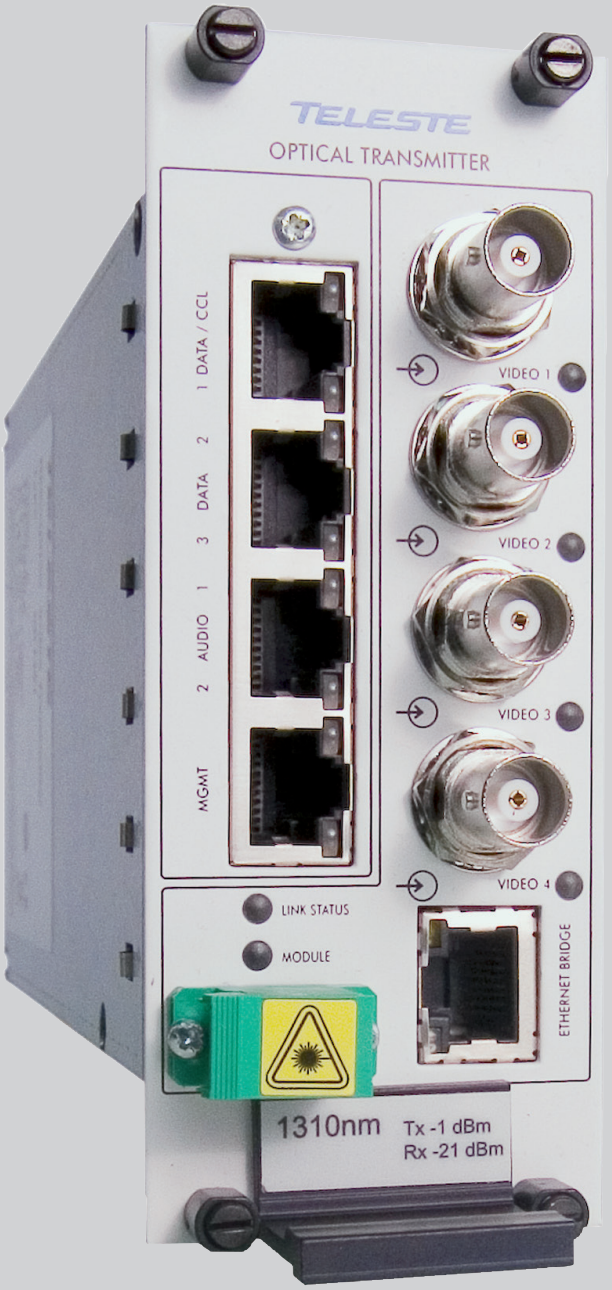
One, four and eight channel video links

CFO First Mile series consist of fibre optic modems which provide a high quality and losless video transmission for variety of CCTV applications.



CFO432 – 4 channel MM video link
CFO161 – 1 channel SM video link
CFO191 – 1 channel SM video link
CFO461 – 4 channel SM video link
CFO491 – 4 channel SM video link
CFO861 – 8 channel SM video link
CFO891 – 8 channel SM video link

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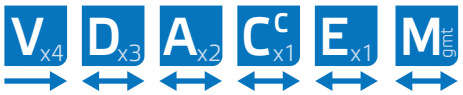
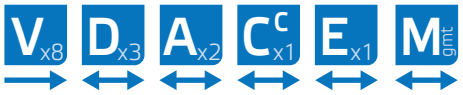
Single/multimode 1, 4 and 8 channel video link for uni-directional video and bi-directional audio, data, contact closure & Ethernet transmission, In-band management

CFO161/191 singlemode

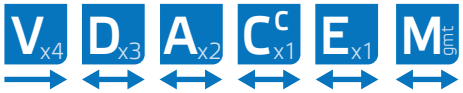
CFO461/491 singlemode



CFO861/891 singlemode



CFO432 multimode



Welcome, and thank you for purchasing Teleste's CFO Products.

Introduction

The **CFO161/191/461/491/861/891/432** are a basic building block for multi-channel video transmission system providing uni-directional transmission of 1 / 4 / 8 uncompressed video channels with three bi-directional data, two audio, one contact closure and one Fast Ethernet signals over single / multimode fibre.

PAL, **NTSC** and **SECAM** video formats are supported to provide a transparent video transmission. With 4-ch and 8-ch models it is also possible to transmit 2 / 4 **S-video** channels that comprises of separate luminance (**Y**) and chrominance (**C**) signals. Video interface is also compatible with CSX series multiplexers. All common data protocols are supported as well and are easily configurable by terminal software interface.

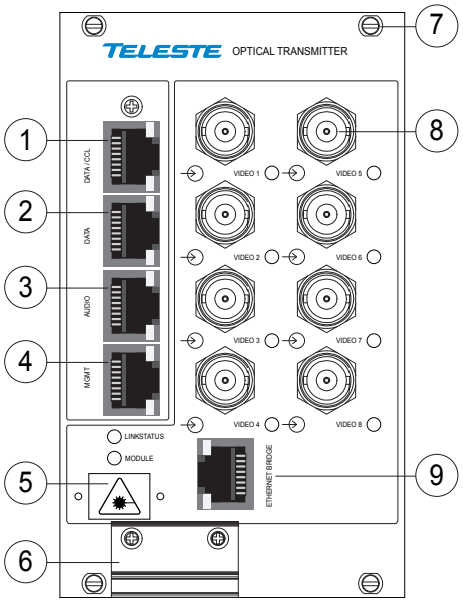
Optical transmission is based on **class 1M laser** operation. The multiplexed data stream of 1.2 / 1.9 Gbps enables a full quality and a zero-delay (latency free) video transmission in one singlemode fiber over distances of tens of kilometres and in multimode fiber up to 1-2 kilometers approximately (depends highly on fibre type).

Management connection between **CFO** units and e.g. laptop or PSION is based either on a serial data, or a TCP/IP communication by means of any terminal type program. Management user interface follows the general guidelines of a Command Line Interface type operation (CLI) and it is meant for configuration and controlling of **CFO** units.

As with all CFO Platform products the units meet all standard EMC and environmental requirements.

All units are fully compatible with all CFO rack systems. Stand-alone options are available with the CMA module adapter and a separate mains adapter.

Video Link Front Panel



An exampe view of 8-channel video modem **CRT861**. Except video channels this information is applicable to 1-channel and 4-channel units, as well including CRR receivers.

1) DATA 1 & CCL connector (RJ-45 female)
2) DATA 2 & 3 connector (RJ-45 female)
3) AUDIO 1 & 2 connector (RJ-45 female)
4) Management connector (RJ-45 female)
5) Optical input/output (singelmode SC/APC 8°, multimode SC/PC or LC/UPC)
6) Handle (with unit information)
7) Locking screw (4 pcs)
8) Video input (BNC female) and video indicator led
9) ETHERNET BRIDGE connector (RJ-45 female)

See further information on dedicated sections.

CAUTION:
CFO161/191/461/491/861/891/432 OPTICAL UNITS USES CLASS 1M LASER DIODE. DO NOT STARE INTO BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS.
APPLICABLE STANDARD IEC60825-1: 2001

Frame installation

The **CFO** unit is to be pushed along the guide rails into the installation frame (e.g. **CSR216** or **316** series) and secured with the four locking screws. The unit can be freely positioned in any slot in the frame. (Alarm card slot excluded). The empty positions in the frame should be blanked off with cover plates. The supply voltage is to be provided by a **CPS384** or **CPS390** power supply unit.

Video connections and indicator leds

The impedance of the video connection (BNC female) is 75 Ω.
The nominal input/output level is 1 Vpp. Video connection is equipped with the dual colour VIDEO led on the front panel. See table below for explanation of VIDEO indicator led's lights.

CSX Multiplexer operation

Alternatively the video channel can be used for **CSX** series multiplexer operation --> multiplexed audio/data/contact closure transmission.
No extra adjustments are needed.

S-video operation

It is also possible to transmit either two or four **S-video** signals that comprises of separate luminance (**Y**) and chrominance (**C**) signals (except CFO161). Connect **Y** and **C** signals to any of video inputs. Make sure that the **Y** and **C** connections are corresponding both at **transmitter** and **receiver**. No extra adjustments are needed.

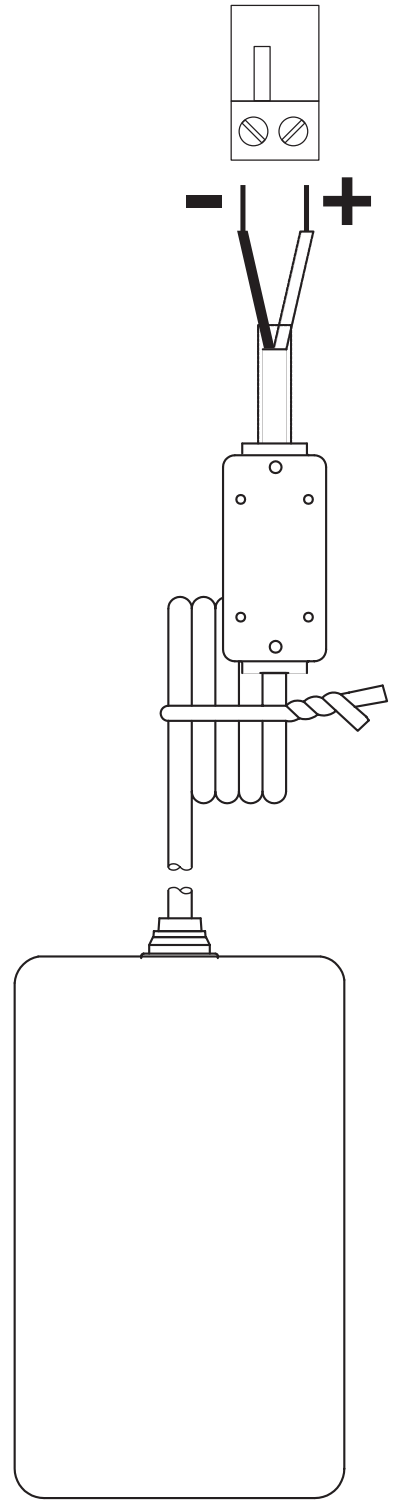
Colour	Status
Green	A signal is present and in nominal level
Yellow	No video signal, or the video level is too low
No light	Video input/output is disabled (via management)

VIDEO indicator operation.

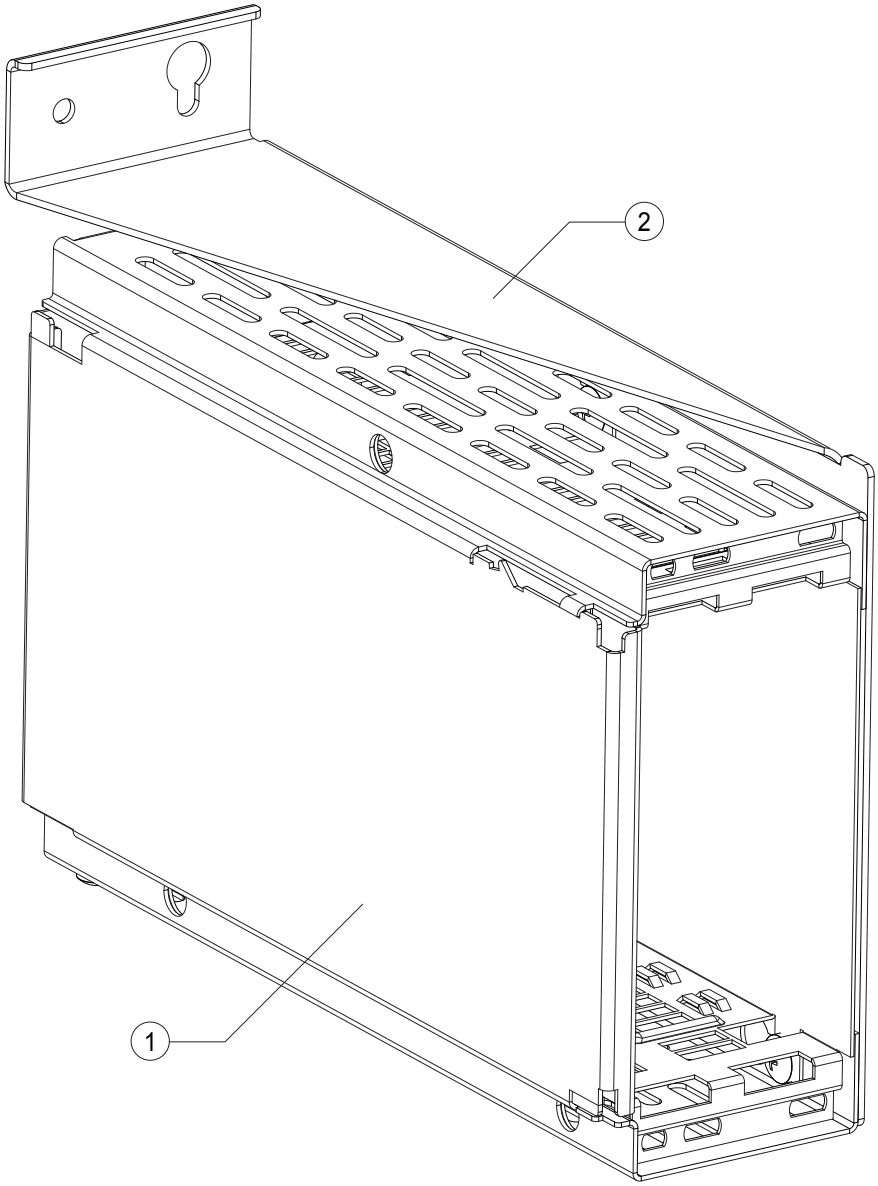
Stand-alone installation

The **CFO** unit can be installed for stand-alone use by using a **CMA025** (installation for 10HP wide CFO series units) or **CMA035** (installation for 15HP wide CFO series units) module adapter. The module should be mounted to a vertical surface.

The 12V DC supply voltage is supplied by the means of a separate mains adapter with a regulated output, (e.g. **CPS251**). Please refer to separate documention for module adapters and mains adapters.

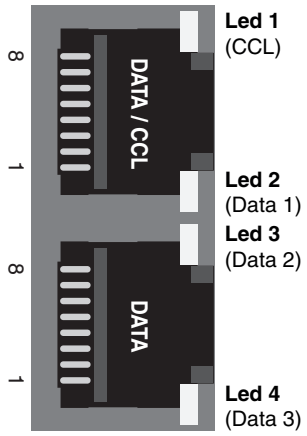


Power supply connection.



CMA025 module adapter with CIK002 rear mounting kit.

1) CMA025 module adapter
2) CIK002 rear mounting kit



DATA/CCL and **DATA** connectors and indicator **LED**s.

Pin	Colour
1	White / green stripe
2	Green
3	White / orange stripe
4	Blue
5	White / blue stripe
6	Orange
7	White / brown stripe
8	Brown

CIC603 cable's pinout / wire colors (RJ-45 male / open wires).

Led	Colour	Status
1	Green	CCL is on
	Yellow	CCL is off
2	Green	Channel input active
	Yellow	Channel input passive
	No light	Channel disabled
3	Green	Channel input active
	Yellow	Channel input passive
	No light	Channel disabled
4	Green	Channel input active
	Yellow	Channel input passive
	No light	Channel disabled

DATA/CCL and **DATA** connection's indicator operation.

Data connections

The **CFO** link contains three independent bi-directional data channels (TX <--> RX). The connector is type **RJ-45 female**. Supported data modes for data channel 1 & 2 are **RS232**, **RS422**, **RS485-2w** and **RS485-4w**. Data channel 3 is fixed for **RS232** mode only. A recommended cable for DATA connection is **CIC603** (RJ-45/open wires, 2 meters). The desired data mode for data channel 1 & 2 can be set via management connection (see page 13). The default factory settings are; **data ch1 RS485-2w + dwell time 75µs and data ch2 RS232.**

Pin	Signal	RS232	RS422	RS485-2w	RS485-4w
1	Data 1		in -	in / out -	in -
2	Data 1	in	in +	in / out +	in +
3	Data 1	out	out -		out -
4	CCL in				
5	Ground				
6	Data 1		out +		out +
7	CCL out A				
8	CCL out B				

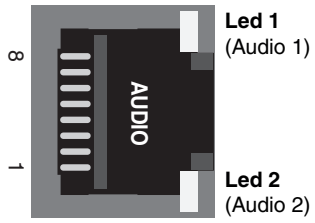
DATA/CCL connector's pinout.

Pin	Signal	RS232	RS422	RS485-2w	RS485-4w
1	Data 2		in -	in / out -	in -
2	Data 2	in	in +	in / out +	in +
3	Data 2	out	out -		out -
4	NC				
5	Ground				
6	Data 2		out +		out +
7	Data 3	in			
8	Data 3	out			

DATA connector's pinout.

Data mode	Input termination options
RS232	None
RS422	No term (with failsafe, 10 kΩ line biasing) Line termination (120 Ω)
RS485 - 2w	No term (with failsafe, 10 kΩ line biasing) + Dwell time adjustable 0...65535µs Hard bias (forced 680 Ω line biasing) Line termination (120 Ω)
RS485 - 4w	No term (with failsafe, 10 kΩ line biasing) Hard bias (forced 680 Ω line biasing) Line termination (120 Ω)

Data input termination options for data channels 1 & 2.
See CLI description for configuration settings (dataterm and databias).



AUDIO connector.

Pin	Colour
1	White / green stripe
2	Green
3	White / orange stripe
4	Blue
5	White / blue stripe
6	Orange
7	White / brown stripe
8	Brown

CIC603 cable's pinout / wire colors (RJ-45 male / open wires).

Audio connection

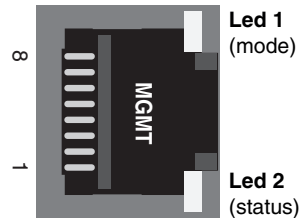
The **CFO** link contains two bi-directional audio channels (TX <--> RX), which can be used for one stereo audio or two mono audio purposes. The AUDIO interface supports both balanced (both channels separately) and unbalanced wiring. **The default audio input impedance is set to high impedance (>10 kΩ)**. Alternatively the audio input impedance can be set to 600 Ω (this setting requires balanced wiring for both channels). The audio output impedance is set to 10 Ω. The connector type is a RJ-45 female. A recommended AUDIO cable is CIC603 (RJ-45/open wires). The audio channels operates independently, i.e. despite the absence of all video signals.

Pin	Balanced signal	Unbalanced signal
1	Audio 1 out -	GND
2	Audio 1 out +	Audio 1 out
3	Audio 2 out -	GND
4	Audio 2 in +	Audio 2 in
5	Audio 2 in -	GND
6	Audio 2 out +	Audio 2 out
7	Audio 1 in -	GND
8	Audio 1 in +	Audio 1 in

AUDIO connector's pinout. *(**Note!** RJ45 connector shield is grounded)*.

Led	Colour	Status
1	Green	Audio 1 signal level is good
	Yellow	Audio 2 signal level is too low
	Green / Yellow blinking	Audio 1 signal level is too high
	No light	Audio 1 channel is disabled
2	Green	Audio 2 signal level is good
	Yellow	Audio 2 signal level is too low
	Green / Yellow blinking	Audio 2 signal level is too high
	No light	Audio 2 channel is disabled

Audio (input) connection's indicator operation.



Mgmt connector.

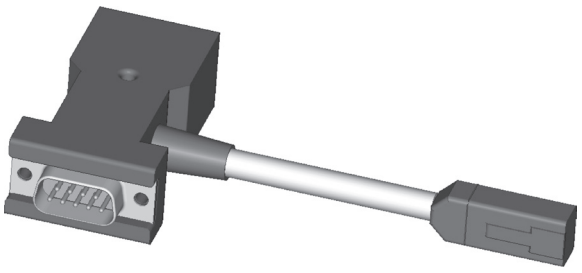
Management (mgmt) data connection

Access to the device management is provided either with serial data (**RS-232**) or with **TCP/IP** connection. The management connector type is a RJ-45 female. When using **TCP/IP** connection any type of **CAT5** Ethernet cable can be used (interface has auto feature). Connection type is 10/100Base-TX with autonegotiation enabled (default).

Pin	Signal
1	Ethernet mgmt (Tx + / Rx +)
2	Ethernet mgmt (Tx - / Rx -)
3	Ethernet mgmt (Rx + / Tx +)
4	Not used
5	Serial mgmt (RS232 in)
6	Ethernet mgmt (Rx - / Tx -)
7	Not used
8	Serial mgmt (RS232 out)
Shield	Ground

Mgmt connector's pinout.

A simultaneous management session using both connection types can be done by means of **CIC505** connection adapter.



CIC505 connection adapter. (Allowing simultaneous serial and TCP/IP connection via MGMT connector).

RJ-45 male	D9 male	RJ-45 female
1	-	1
2	-	2
3	-	3
4	-	-
5	2	-
6	-	6
7	-	-
8	3	-
Shield	5	-

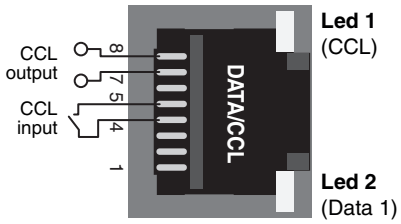
CIC505 connector pinout
(RJ-45 male/D9 male/RJ-45 female).

Led	Colour	Status
1	Green	Full duplex
	Green blinking	Collisions in data
	No light	Half duplex
2	Yellow	Mgmt link up
	Yellow blinking	Ethernet mgmt active
	No light	Mgmt link down

Mgmt connection's indicator operation.

PC/PSION	D9 female	RJ-45 male	CFO
Receive data	2	8	Mgmt output
Transmit data	3	5	Mgmt input
System ground	5	Shield	Ground

Management cable (**CIC505)** pinout (D9 female / RJ-45 male).



CCL connector. CCL led indicates status of CCL input/output signal.

Pin	Colour
1	White / green stripe
2	Green
3	White / orange stripe
4	Blue
5	White / blue stripe
6	Orange
7	White / brown stripe
8	Brown

CIC603 cable's pinout / wire colors (RJ-45 male / open wires).

Contact closure loop (CCL) connection

The **CFO** link contains one bi-directional contact closure channel line (TX <--> RX). The CCL input is a normal short circuit on/off - signal between connector's contact pins 4 and 5 (max loop resistance approximately 120 Ω). The CCL output is a normal relay on/off - signal between connector's contact pins 7 and 8 (maximum switching 30 V DC/V AC, 1A). The connector type is a RJ-45 female. The recommended cable for CCL use is **CIC603** (RJ-45/open wires).

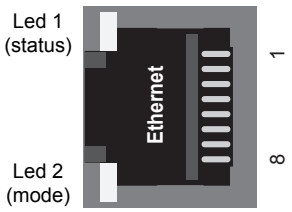
The CCL output channel can be alternatively configured for VSA (video source alarm) or LSA (link source alarm) usage via management connection (see page 10).

Pin	Signal	RS232	RS422	RS485-2w	RS485-4w
1	Data 1		in (-)	in / out (-)	in (-)
2	Data 1	in	in (+)	in / out (+)	in (+)
3	Data 1	out	out (-)		out (-)
4	CC1	in			
5	Ground				
6	Data 1		out (+)		out (+)
7	CCL/VSA/LSA	out A			
8	CCL/VSA/LSA	out B			

DATA 3 & CCL connector's pinout.

Led	Colour	Status
1	Green	CCL output is closed (pin 4 to ground)
	Yellow	CCL output is open

CCL indicator operation.



Ethernet Bridge connector.

Ethernet Bridge connection

The ETHERNET BRIDGE interface provides one Ethernet 10/100Base-Tx port for any IP device requiring Ethernet connectivity. The connector type is a RJ-45 female. **Default port configuration is with autonegotion feature enabled**.

Note! *It is also possible to disable ETHERNET BRIDGE via management.*

Pin	Signal
1	Tx + / Rx +
2	Tx - / Rx -
3	Rx + / Tx +
4	
5	
6	Rx - / Tx -
7	
8	

Ethernet Bridge connector's pinout.

Led	Colour	Status
1	Yellow	Link up
	Yellow blinking	Link active and traffic detected
	No light	Link down or disabled
2	Green	Full Duplex
	Green blinking	Collision activity
	No light	Half Duplex

Ethernet bridge interface's indicator operation.

Video Source Alarm (VSA)

The **CCL output** channel can be alternatively configured for Video Source Alarm (**VSA**) monitoring. Instead of normal CCL use, the CCL output can be used to provide a VSA signal if a loss of video signal occurs.
When VSA mode is enabled at **transmitter** and if video signal is missing (e.g. a camera malfunction, link otherwise operates normally), the CCL output pins are closed. Using VSA at just one end of the link enables the opposite path to be used for standard CCL operation (simplex). In case when VSA is enabled both at **transmitter** and **receiver**, the CCL channel is no longer available for any other use. When VSA is disabled the CCL channel is available for normal use in both directions. The VSA mode can be set on/off via management connection. See page 28 for more information how to configure VSA operation.

Note! *Enabling VSA on any channel overrides normal contact closure functionality.*

Led	Colour	Status
1	Green blinking	Video OK
	Yellow blinking	Video missing / VSA active

CCL indicator operation when **VSA** is enabled.

Link Source Alarm (LSA)

The **CCL output** channel can be alternatively configured for Link Source Alarm (**LSA**) monitoring. Instead of normal CCL use, the CCL output can be used to provide a LSA signal if a loss of optic link occurs. When LSA mode is enabled at transmitter and if optical communication is disturbed seriously (link fail alarm due to e.g. a cable break or damage, a laser fail etc), the CCL output pins are closed. Using LSA at just one end of the link enables the opposite path to be used for standard CCL operation (simplex). In case when LSA is enabled both at **transmitter** and **receiver**, the CCL channel is no longer available for any other use. When LSA is disabled the CCL channel is available for normal use in both directions.
The LSA mode can be set on/off via management connection.
See page 23 for more information how to configure LSA operation.
For a practical use the LSA/CCL operation can be also used to control an optical switch in fibre redundant applications.

Note! *Enabling LSA overrides normal contact closure and VSA functionality.*

Led	Colour	Status
1	Green blinking	Link OK
	Yellow blinking	Link missing / LSA active

CCL indicator operation when LSA is enabled.

Link status and module indicator leds

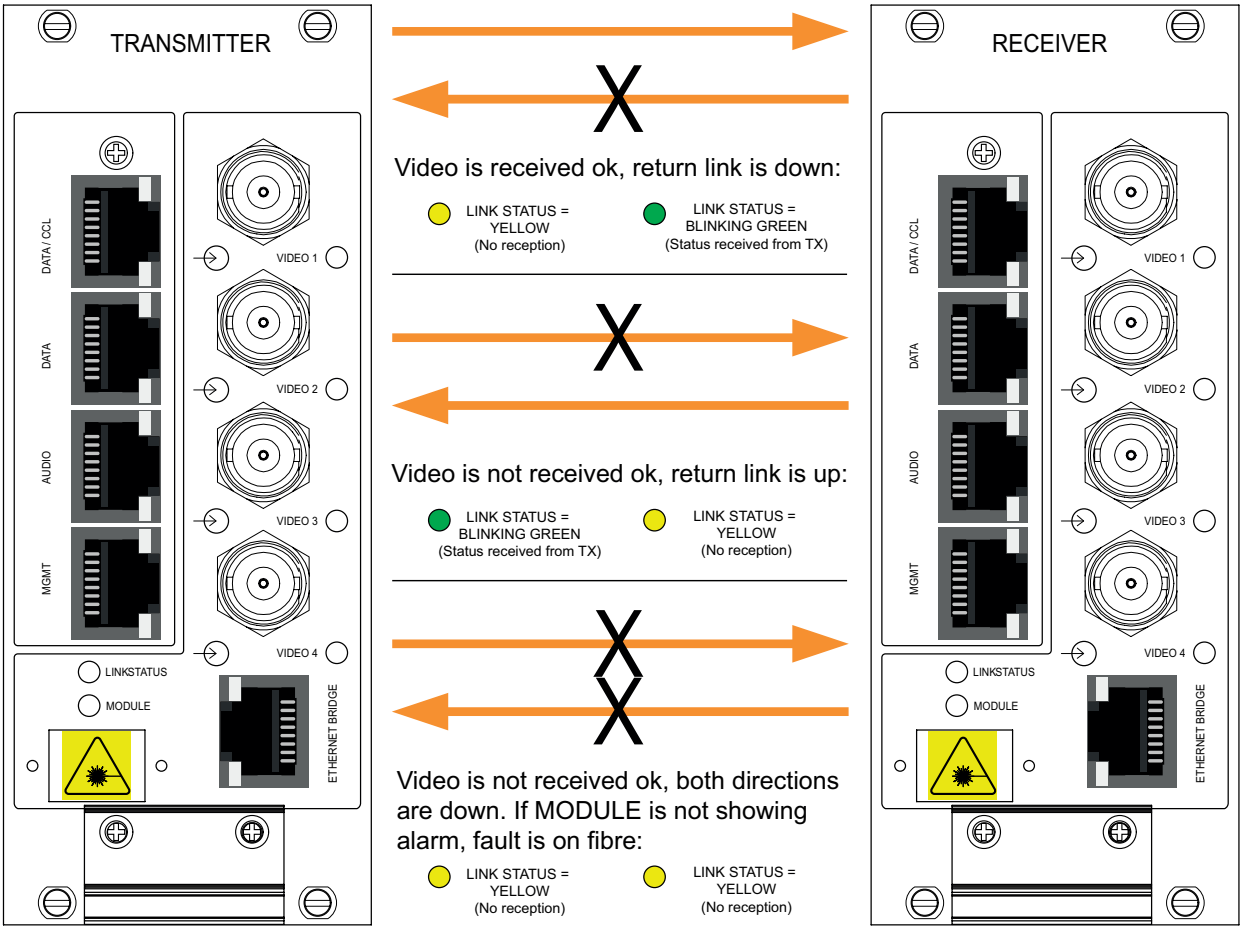
The **CFO** contains LINK STATUS and MODULE indicators which inform generic status of unit.

Colour	Status
Green	Optical signal level is adequate and syncronization on link level is achieved
Blinking Green	Link alarm from remote end: No optical signal received
Yellow	Optical signal is missing or input level is too low

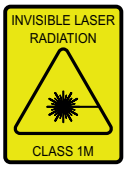
LINK STATUS indicator operation.

Colour	Status
Green	Normal operation
Red	Supply voltage is not in the permitted range or a hardware failure

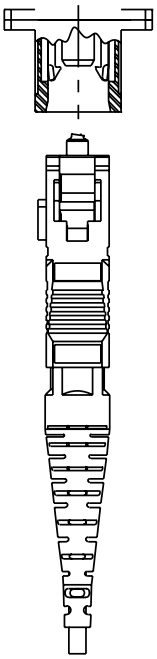
MODULE indicator operation.


TRANSMITTER
RECEIVER
DATA / CCL
DATA
AUDIO
MGMT
VIDEO 1
VIDEO 2
VIDEO 3
VIDEO 4
LINKSTATUS
MODULE
ETHERNET BRIDGE
Video is received ok, return link is down:
LINK STATUS = YELLOW (No reception)
LINK STATUS = BLINKING GREEN (Status received from TX)
Video is not received ok, return link is up:
LINK STATUS = BLINKING GREEN (Status received from TX)
LINK STATUS = YELLOW (No reception)
Video is not received ok, both directions are down. If MODULE is not showing alarm, fault is on fibre:
LINK STATUS = YELLOW (No reception)
LINK STATUS = YELLOW (No reception)

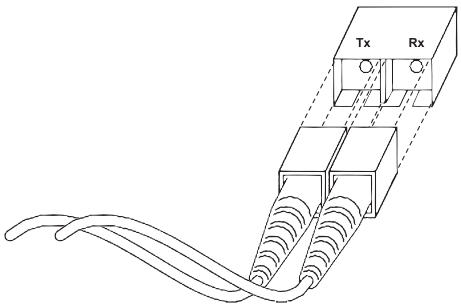
LINK STATUS indicator operation example.



front view



The optical connector type for singlemode is **SC/APC** (CFO1x1/4x1/8x1).



The optical connector type for multimode is **LC/UPC** (CFO432).

Optical Interface

In units operating over single mode fibre the optical connector type is SC/APC (8° angle polished) whereas the units for multimode fibre transmission (CFO432) have duplex-LC/UPC optical connectors.

Some generic notes for successfull optical connections:

* Ensure that the fiber patch cord is damage-free (fiber condition can be easily checked by a visible laser tester)
* Do not exceed the minimum bending radius of the fibre
* Avoid sharp corners on cable shelves and in cable management in overall
* Ensure that correct optical connectors are used (e.g. never use SC/PC against SC/APC)
* Open connectors are always secured by dustcaps during maintenance
* Always before mating clean all connectors (wet cleaning by high purity alcohol & drying, or dry cleaning with reel-based lint-free wipes, fiber adapters may require special ferrule end-face cleaning tools)
* Before making any visual inspections ensure that system has been shutdown or no optical power is present
* For fault finding at least a optical power meter is required, a complex fiber cable environment may require use of an OTDR equipment

Optical connection meets **class 1M** laser safety requirements of IEC 60825-1: 2001 and US department of health services 21 CFR 1040.10 and 1040.11 (1990).

Optical signal levels

The optical output level are constant and dependant on the model type.

The typical optical output level for basic bidirectional 1310/1310 nm link (**CFOx61** series) is –1 dBm (less than 1 mW). Respectively the minimum typical optical input level at receiving end is -21 dBm.

In WDM operated links over 1550/1310 nm wavelenghts (**CFOx91** series) the typical output level is +1 dBm (approx 1.2 mW). On the receiving end the minimum optical input level is typically -23 dBm. Please note that due to different optical windows the maximum link budget in terms of kilometers is different on forward (video) and return paths.

The output level of **CFO432** modems is typically -7 dBm. However the optical levels have less significance when dealing with digital high speed data propagation in multimode fibre. Typically the distance limitations are set by the cable type (OM class, fibre bandwidth vs. wavelenght etc.).

When testing a CFO link over a short fiber patch cable it is advised to use an additional optical attenuator to guarantee system safe operation. Typically the maximum allowed input level for bi-directional links is 0 dBm. In most cases a suitable attenuator value for testing is 5 dB. Please check also that attenuators are high quality doped-fibre type with an excellent reflection loss value (air-gap attenuators may cause difficulties on link association due to poor reflection loss performance).

Command Line Interface - **CLI**

General

The **CFO** unit includes a command line interface (CLI) for configuration purposes. CLI is accessed through any terminal program (e.g. Hyper Terminal or Telnet) over serial data or TCP/IP connection. The command structure is the same for both session types.

System requirements for CLI

* PC equipped terminal emulation program.
* **RS232**-cable or any CAT5 Ethernet cable (direct or crossover).
* **CIC505** connection adapter together with CAT5 Ethernet cable and null modem cable (D9 female - D9 female) allowing simultaneous connection of both methods if required.

User groups

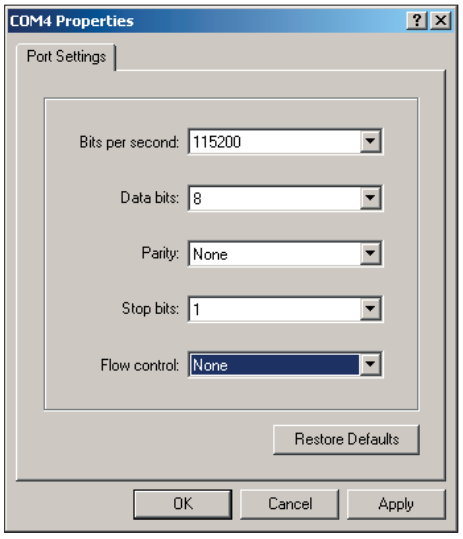
There are two different user levels, which are determined by the username and password. The Admin password can be changed with a command **passwd**.

User group	Default username	Default password	Authority
Administrator	admin	cfoopx	Read and write access to all pages and all settings
Guest	guest	press enter	Read only access

User groups for CLI.

Naming a terminal connection.

Selecting COM port.



Settings for COM port.

Connection methods - Serial connection

1. Start the Windows Hyper Terminal program (in Windows by choosing --> Start/Programs/Accessories/Communications/Hyper Terminal). Wait until the following "**Connection Description**" window appears on the screen.

2. Enter a name for connection, e.g. "**CFO Management**" and click OK button to continue. The following "**Connect To**" window appears on the screen.

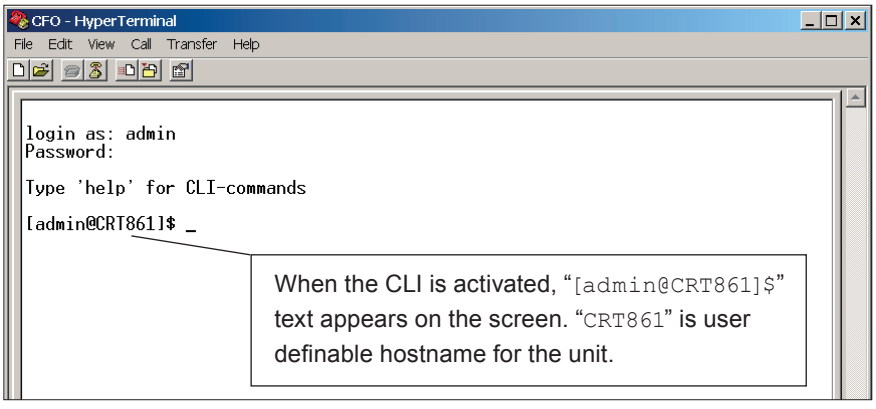
3. Choose **COM** port where the **management (RS232)** cable is connected, e.g. **COM4** port and click OK button to continue. The following "**COM4 Properties**" window appears on the screen. Set here the values as described in table below. Click OK button to continue. The "CFO Management" window appears on the screen.

4. To activate the terminal connection first press Enter --> "`login as:`" appears on the screen. Enter the required user name and the password (see section user groups, page 12). The Hyper Terminal window appears on the screen. The terminal connection to **CFO** device is now completed and you can now use the CLI commands to manage the device.

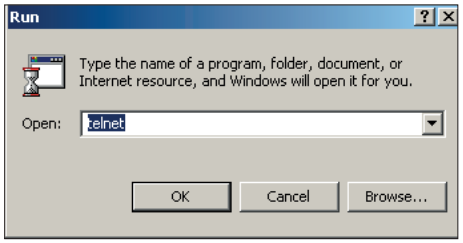
The Hyper Terminal connection can be terminated by selecting File/Exit, Alt+F4 or clicking ✕ on the right upper corner of Hyper Terminal window.

Setting	Value
Emulation	VT100, VT102 or ANSI
Protocol	RS232 (serial)
Baud rate	115 200 kbps
Data bits	8
Parity	None
Stop bits	1
Flow control	None

Port settings to terminal connection.


CFO - HyperTerminal
File Edit View Call Transfer Help
login as: admin
Password:
Type 'help' for CLI-commands
[admin@CRT861]$ _
When the CLI is activated, "[admin@CRT861]$" text appears on the screen. "CRT861" is user definable hostname for the unit.

The Windows Hyper terminal program's window view.

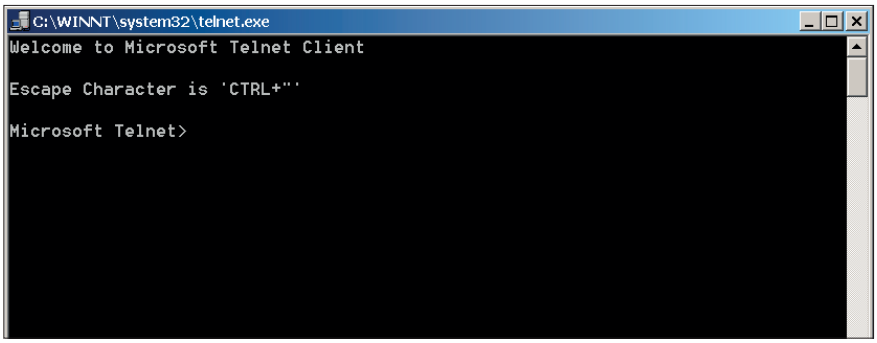


Run utility program view.

Connection methods - TCP/IP

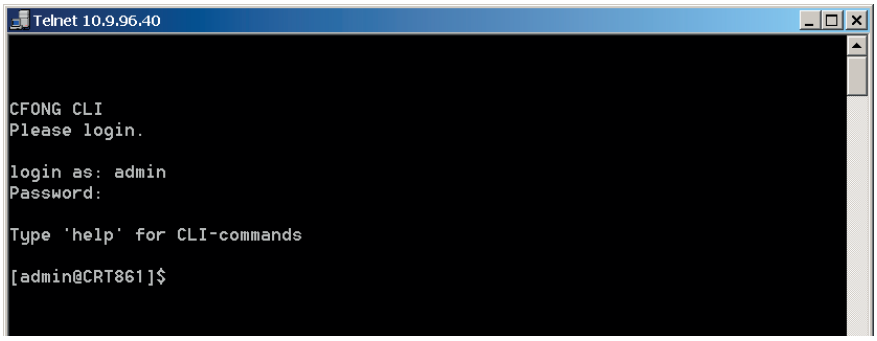
1. Start the **Run** utility program (in Windows by choosing -> Start/ Run...). Wait until the following "**Run**" window appears on the screen.

2. Write **Telnet** and click OK button to continue. The following "**Telnet.exe**" window appears on the screen.



Telnet program view (Windows XP).

3. Enter the following command to the **Telnet** prompt: **open** [**IP address**], where the IP address is the CFO device's IP address, e.g. **10.9.96.40**.



Telnet program view.

4. Enter the user name and the password. The following "**Telnet 10.9.96.40**" window appears on the screen. The **Telnet** connection to **CFO** device is now established and you can now use the **CLI** commands to management the device. The Telnet display is identical of local **CLI** view and as well the command structure follows the same rules as local **CLI** connection. The **Telnet** connection can be terminated by entering command **exit**.

Note! *Assign a free IP address, which is on the same subnet as the PC; i.e., the first three sets of numbers of computer's IP address should match the first three sets of numbers of CFO's IP address.*

Setting	Transmitter	Receiver
IP address	10.9.96.40	10.9.96.50
Netmask	255.255.255.0	255.255.255.0
Gateway	10.9.96.1	10.9.96.1

Factory default settings for TCP/IP connection.

Detailed descriptions of commands

Commands in brief

This chapter guides how to use the command line interface (CLI) to configure the settings of **CFO** devices. The CLI is a screen interface that allows the user to interact with the operating system by entering commands and optional arguments.

How to use the CLI commands

CLI consists of several commands. To execute the command, press **enter** after typing command. Entering **help** displays all valid commands. Entering **help** and **a command** displays further options of command. The remote device's settings can be changed with entering **r** [command] [value]. (Inband communication over fibre connection).
Ctrl -c is the interrupt key sequency and returns user to the prompt, **Ctrl -u** wipe out a line of text.

Note! *All letters must be typed as lowercase.*

```
[admin@CRT861]$ help

all                 Enable or disable all ports
audio               Display or enable/disable an audio channel
audiobal            Balanced input on an audio channel
audioimp            600 ohm input impedance on audio channels
ccaction            Contact closure action on alarm
confget             Get configuration from a tftp server
confput             Upload configuration to a tftp server
data                Display or enable/disable a data channel
databias            Biasing on a data channel
datadwell           Dwelltime on a sampled data channel
dataterm            Termination on a data channel
datatype            Physical interface type on a data channel
eth                 Display or enable/disable a network interface
ethauto             Auto negotiation on a network interface
ethduplex           Duplex on a network interface
ethspeed            The speed on a network interface
exit                Log out from command line interface
factory             Set factory defaults
help                Display list of commands or usage of a single command
hostname            Hostname of the device
ipcfg               IP settings
lsa                 Display or enable/disable link source alarm
lsadelay            Link source alarm delay
lsahold             Link source alarm hold time
lsareset            Reset link source alarm to the initial state
passwd              Change user's password
r                   Execute a command on link partner device (remote end)
reboot              Reboot the device
status              Display module status information
swupdate            Update software image from a tftp server
termsize            Size of the terminal window
uptime              Display the time since the last power-up
version             Display version and hardware information of the device
video               Display or enable/disable a video channel
vsa                 Display or enable/disable video source alarm
vsahold             Sideo source alarm hold time

[admin@CRT861]$
```

A short list of commands by using help.

All command

Use the **all** command to enable/disable all audio, data and video ports on the device. Entering **help all** displays a list of options for **all** command.

Example:
all on

Enables all audio, data and video ports

```
[admin@CRT861]$ help all

Usage: all on|off

Enable or disable all audio, data and video ports on the device.

        on|off          Enable or disable all ports.

[admin@CRT861]$
```

Audio command

Use the **audio** command to enable/disable the audio channel. Entering **help audio** displays a list of options for **audio** command.

Example:
audio 1 on

Enables audio channel 1

```
[admin@CRT861]$ help audio

Usage: audio PORT|all [on|off]

Display or enable/disable an audio channel.

        PORT|all        Defines the number of the audio channel.
        on|off          Enable or disable the audio channel.

[admin@CRT861]$
```

Audiobal command

Use the **audiobal** command to enable/disable balanced interface on the audio channel. Entering **help audiobal** displays a list of options for **audiobal** command.

Example:
audiobal 1 on

Enables balanced interface for audio channel 1

```
[admin@CRT861]$ help audiobal

Usage: audiobal PORT [on|off]

Display or enable/disable balanced input on an audio channel.

        PORT            Defines the number of the audio channel.
        on|off          Enable or disable the balanced input.

[admin@CRT861]$
```

Audioimp command

Use the **audioimp** command to set 600 W input impedance to both audio channels 1 & 2 (the default factory setting is 10 kΩ).
This setting requires balanced wiring for both channels. Entering **help audioimp** displays a list of options for **audioimp** command.

Example:
audioimp on

Sets 600 Ω input impedance to audio channels 1 & 2

```
[admin@CRT861]$ help audioimp

Usage: audioimp [on|off]

Display or enable/disable 600 ohm input impedance on audio channels.

        on|off          Enable or disable the input impedance.

[admin@CRT861]$
```

Ccaction command

Use the **ccaction** command to display or set the contact closure action on alarm. Entering **help ccaction** displays a list of options for **ccaction** command.

```
[admin@CRT861]$ help ccaction

Usage: ccaction [open|close]

Display or set the contact closure action on alarm.
NOTE! If LSA fires the alarm and LSA delay is greater than 0,
the contact closure circuit will not stay in the assigned position,
but keeps strolling until link-up is detected.

        open            CC contact is opened on alarm.
        close           CC contact is closed on alarm.

[admin@CRT861]$
```

Confget command

Use the **confget** command to download the stored configuration from a TFTP-server. Entering **help confget** displays a list of options for **confget** command.

Note! *TFTP server must be installed, configured correctly and activated before using confget command.* *(See page 28).*

Example:
confget 10.9.96.1 dconfig.tar.gz

Gets dconfig.tar.gz named configuration from address 10.9.96.1

```
[admin@CRT861]$ help confget

Usage: confget SERVER-IP [FILENAME]

Get configuration from a tftp server.
NOTE! This may affect on IP settings.

     SERVER-IP   IP address of the tftp server.
     FILENAME    Name of the target file.
                 Defaults to 'dconfig.tar.gz'.

[admin@CRT861]$
```

Confput command

Use the **confput** command to upload the current configuration to a TFTP-server. Entering **help confput** displays a list of options for **confput** command.

***Note!** TFTP server must be installed, configured correctly and activated before using confput command. (See page 29).*

Example:
confput 10.9.96.1 dconfig.tar.gz

Puts dconfig.tar.gz named configuration to address 10.9.96.1

```
[admin@CRT861]$ help confput

Usage: confput vdac|eth|all SERVER-IP [FILENAME]

Upload configuration to a tftp server.
NOTE! Passwords and hostname will not be stored.

      vdac        Store video, data channel, audio and
                  contact closure settings.
      eth         Store Ethernet and IP address settings.
      all         Store all settings.
      SERVER-IP   IP address of the tftp server.
      FILENAME    Name of the target file.
                  Defaults to 'dconfig.tar.gz'.

[admin@CRT861]$
```

Data command

Use the **data** command to enable/disable data channel. Entering **help data** displays a list of options for **data** command.

Example:
data 1 on

Enables data channel 1

```
[admin@CRT861]$ help data

Usage: data PORT|all [on|off]

Display or enable/disable a data channel.

        PORT|all       Defines the number of the data channel.
        on|off         Enable or disable the data channel.

[admin@CRT861]$
```

Databias command

Use the **databias** command to change device data bias settings. Entering **help databias** displays a list of options for **databias** command.

```
[admin@CRT861]$ help databias

Usage: databias port [on|off]

Display or enable/disable biasing on a data channel.
NOTE! Termination is not effective while bias is disabled.

        port         Defines the number of the data channel.
        on|off       Enable or disable biasing on the data channel.

[admin@CRT861]$
```

Datadwell command

Use the **datadwell** command to change device data port dwell time settings. Entering **help datadwell** displays a list of options for **datadwell** command. Valid only when selected data format is 2-wire RS-485. Unit in microseconds (available 0...65 535µs).

Example:
datadwell 1 50

Sets 50µs dwelltime to data channel 1

```
[admin@CRT861]$ help datadwell

Usage: datadwell PORT [DWELLTIME]

Display or set dwelltime on a sampled data channel.

        PORT            Defines the number of the data channel.
        DWELLTIME       Dwelltime in microseconds.Valid range is
                        0-65535.

[admin@CRT861]$
```

Dataterm command

Use the **dataterm** command to change device data port termination settings. Entering **help dataterm** displays a list of options for **dataterm** command. Required only when several devices are sharing tha same data bus (i.e. line termination).

```
[admin@CRT861]$ help dataterm

Usage: dataterm PORT [on|off]

Display or enable/disable termination on a data channel.
NOTE! Termination is not effective while bias is disabled.

        PORT     Defines the number of the data channel.
        on|off   Enable or disable termination on the data channel.

[admin@CRT861]$
```

Datatype command

Use the **datatype** command to change device data interface settings. Entering **help datatype** displays a list of options for **datatype** command.

```
[admin@CRT861]$ help datatype

Usage: datatype PORT [rs-232|rs-422|rs-485|rs-485-4wire]

Display or set physical interface type on a data channel.
NOTE! Data channel 3 is fixed to rs-232.

        PORT      Defines the number of the data channel.
        rs-TYPE   Set physical interface type on the data channel.

[admin@CRT861]$
```

Eth command

Use the **eth** command to enable/disable device network interface. Entering **help eth** displays a list of options for **eth** command.

Example:
eth 1 on

Enables Management Ethernet port

```
[admin@CRT861]$ help eth

Usage: eth PORT [on|off]

Display or enable/disable a network interface.

        PORT            Defines the network interface.
                          1 = Mgmt Ethernet.
                          2 = Bridge Ethernet.
        on|off          Enable or disable the network interface.

[admin@CRT861]$
```

Ethauto command

Use the **ethauto** command to enable/disable auto negotiation feature of network interface. Entering **help ethauto** displays a list of options for **ethauto** command.

```
[admin@CRT861]$ help ethauto

Usage: ethauto PORT [on|off]

Display or enable/disable auto negotiation on a network interface.

        PORT            Defines the network interface.
                          1 = Mgmt Ethernet.
                          2 = Bridge Ethernet.
        on|off          Enable or disable the auto negotiation.

[admin@CRT861]$
```

Ethduplex command

Use the **ethduplex** command to set network interface to half or full duplex mode. Entering **help ethduplex** displays a list of options for **ethduplex** command.

***Note!** Ethauto command must be disabled before using the ethduplex command! (If the ethauto command is enabled, ethduplex command doesn't have an effect).*

```
[admin@CRT861]$ help ethduplex

Usage: ethduplex PORT [half|full]

Display or set the duplex on a network interface.

        PORT            Defines the network interface.
                          1 = Mgmt Ethernet.
                          2 = Bridge Ethernet.
        half|full       Set the duplex on the interface.

[admin@CRT861]$
```

Ethspeed command

Use the **ethspeed** command to set network interface speed to 10 or 100 Mbps. Entering **help ethspeed** displays a list of options for **ethspeed** command.

Note! *Ethauto command must be disabled before using the ethspeed command! (If the ethauto command is enabled, ethspeed command doesn't have an effect).*

```
[admin@CRT861]$ help ethspeed

Usage: ethspeed PORT [10|100]

Display or set the speed on a network interface.

        PORT            Defines the network interface.
                          1 = Mgmt Ethernet.
                          2 = Bridge Ethernet.
        10|100          Set the speed of the interface.

[admin@CRT861]$
```

Exit command

Use the **exit** command to log out from CLI. Entering **help exit** displays a list of options for **exit** command.

```
[admin@CRT861]$ help exit

Usage: exit

Log out from command line interface.

[admin@CRT861]$
```

Factory command

Use the **factory** command to set factory defaults. Entering **help factory** displays a list of options for **factory** command.

```
[admin@CRT861]$ help factory

Usage: factory

Set the factory defaults.
NOTE! This will affect on IP settings.

[admin@CRT861]$
```

Help command

Use the **help** command to view a list of CLI commands. Entering **help help** displays a list of options for **help** command. Entering **help [command]** displays options for command.

```
[admin@CRT861]$ help help

Usage: help [COMMAND]

Display list of commands or view the usage of given COMMAND.

[admin@CRT861]$
```

Hostname command

Use the **hostname** command to view or change the device hostname. Entering **help hostname** displays a list of options for **hostname** command.

```
[admin@CRT861]$ help hostname

Usage: hostname [NAME]

Display or change the hostname.

        NAME            The new hostname.

[admin@CRT861]$
```

Ipcfg command

Use the **ipcfg** command to change device IP settings. Entering **help ipcfg** displays a list of options for **ipcfg** command.

Note! *Changing the IP address over TCP/IP connection will terminate the communication. A new connection must be created over a serial connection or with new IP address.*

```
[admin@CRT861]$ help ipcfg

Usage: ipcfg [IP-ADDRESS NETMASK GATEWAY]

Display or change the ip settings.

        IP-ADDRESS      IP address in dotted notation.
        NETMASK         Subnet mask.
        GATEWAY         Default gateway.

[admin@CRT861]$
```

Lsa command

Use the **lsa** command to enable/disable LSA monitoring on the device. Entering **help lsa** displays a list of options for **lsa** command.

```
 [admin@CRT861]$ help lsa

 Usage: lsa [on|off]

 Display or enable/disable LSA monitoring on the device.
 NOTE! Enabling LSA overrides normal contact closure and VSA func-
 tionality.

         on|off          Enable or disable LSA monitoring.

 [admin@CRT861]$
```

Lsadelay command

Use the **lsadelay** command to view or change the devices source alarm switching delay. Entering **help lsadelay** displays a list of options for **lsadelay** command.

```
[admin@CRT861]$ help lsadelay

Usage: lsadelay [DELAY]

Display or set the link source alarm switching delay. Delay defines
how long the device will wait for the optic link to get up before
operating contact closure circuit.
NOTE! Setting delay to 0 will cause contact closure circuit to stay
in the original alarm state.

        DELAY          Delay in seconds.

[admin@CRT861]$
```

Lsahold command

Use the **lsahold** command to view or change the devices source alarm hold time. Entering **help lsahold** displays a list of options for **lsahold** command.

```
[admin@CRT861]$ help lsahold

Usage: lsahold [HOLDTIME]

Display or set the link source alarm hold time. Holdtime defines how
long will a missing optic link be tolerated before enabling
the alarm.

        HOLDTIME       Hold time in seconds.

[admin@CRT861]$
```

Lsareset command

Use the **lsareset** command to reset device source alarm to its initial state. Entering **help lsareset** displays a list of options for **lsareset** command.

```
[admin@CRT861]$ help lsareset

Usage: lsareset

Reset link source alarm to its initial state. All the timers are
cleared and contact closure circuit set to the resting state.

[admin@CRT861]$
```

Passwd command

Use the **passwd** command to change password for current user. Enter the new password (minimum of 5 characters). Please use a combination of upper and lower case letters and numbers. Entering **help passwd** displays a list of options for **passwd** command.

```
[admin@CRT861]$ help passwd

Usage: passwd OLD-PASS NEW-PASS

Change the password for user 'admin'.

        OLD-PASS        Admin's current password.
        NEW-PASS        The new password for admin.

[admin@CRT861]$
```

R command

Use the **r** command to change remote device's settings. Entering **help r** displays a list of options for **r** command.

```
[admin@CRT861]$ help r

Usage: r COMMAND [PARAMS]

Execute COMMAND on link partner device. Remote commands, except
status, do not work on an uni-directional link.

[admin@CRT861]$
```

Reboot command

Use the **reboot** command to reboot the device. Entering **help reboot** displays a list of options for **reboot** command.

```
[admin@CRT861]$ help reboot

Usage: reboot

Reboot the device.

[admin@CRT861]$
```

Status command

Use the **status** command to view device settings. Use the **status r** command to view remote device settings.

```
[admin@CRT861]$ help status

Usage: status

Display module status information.

NOTE! Exclamation mark next to data channel termination indicates
that the termination is ineffective while the channel's bias is
disabled.

[admin@CRT861]$
```

```
[admin@CRT861]$ status

Unit.............: CRT861
Temperature.......: +48.0C +118.4F
Running on........: Partition 0
Optical link......: Local rx down
Mgmt Ethernet.....: Up, Autoneg, 100HDX
Bridge Ethernet...: Down, Autoneg
Video channel 1...: Enabled, No video
Video channel 2...: Enabled, No video
Video channel 3...: Enabled, No video
Video channel 4...: Enabled, No video
Video channel 5...: Enabled, No video
Video channel 6...: Enabled, No video
Video channel 7...: Enabled, No video
Video channel 8...: Enabled, No video
CC state..........: Input open, Output open
CC output source..: Remote CC input
LSA hold/delay....: 20 / 5 seconds
LSA status........: Disabled
VSA hold time.....: 5 seconds
VSA status........: Disabled
Audio channel 1...: Enabled, Balanced, 600ohm on
Audio channel 2...: Enabled, Balanced, 600ohm on
Audio levels......: 1 no signal, 2 no signal
Data channel 1....: Enabled, rs-485, 75 usec, Bias off, Term off
Data channel 2....: Enabled, rs-232
Data channel 3....: Enabled, fixed rs-232

[admin@CRT861]$
```

CRT861 “status” info example view/settings.

Swupdate command

Use the **swupdate** command to update the firmware image from a tftp server. Entering **help swupdate** displays a list of options for **swupdate** command.

Note! *TFTP server must be installed, configured correctly and activated before using swupdate command. (See page 29).*

Example:
swupdate 1.1.7 10.9.96.1

Updates the firmware image version number 1.1.7 from address 10.9.96.1

```
[admin@CRT861]$ help swupdate

Usage: swupdate VERSION SERVER-IP

Update software image from a tftp server.

        VERSION      Version number of the software image file.
        SERVER-IP    IP address of the tftp server.

[admin@CRT861]$
```

Termsize command

Use the **termsize** command to display or set the terminal window's size. Entering **help termsize** displays a list of options for **termsize** command.

```
[admin@CRT861]$ help termsize

Usage: termsize [LINES]

Display or set the terminal window's size.
Setting zero defaults to 24 lines.

        LINES        Define the height of the terminal window.

[admin@CRT861]$
```

Uptime command

Use the **uptime** command to display the time since the last boot. Entering **help uptime** displays a list of options for **uptime** command.

```
[admin@CRT861]$ help uptime

Usage: uptime

Display the time since the last power-up and the load averages of
past 1, 5 and 15 minutes.

[admin@CRT861]$
```

Version command

Use the **version** command to display version and hardware information of the device. Entering **help version** displays a list of options for **version** command.

```
[admin@CRT861]$ help version

Usage: version

Display version and hardware information of the device.

[admin@CRT861]$
```

Video command

Use the **video** command to display or enable/disable a video channel. Entering **help video** displays a list of options for **video** command.

```
[admin@CRT861]$ help video

Usage: video PORT|all [on|off]

Display or enable/disable a video channel.

        PORT|all       Defines the number of the video channel.
        on|off         Enable or disable the video channel.

[admin@CRT861]$
```

Vsa command

Use the **vsa** command to VSA monitoring on video channel(s). Entering **help vsa** displays a list of options for **vsa** command.

```
[admin@CRT861]$ help vsa

Usage: vsa PORT|all [on|off]

Display or enable/disable VSA monitoring on video channel(s).
NOTE! Enabling VSA on any channel overrides normal
      contact closure functionality.

        PORT|all       Defines the number of the video channel.
        on|off         Enable or disable VSA monitoring.

[admin@CRT861]$
```

Vsahold command

Use the **vsahold** command to display or set the video source alarm holdtime. Holdtime defines how long will a missing video signal be tolerated before enabling the alarm. Entering **help vsahold** displays a list of options for **vsahold** command.
Holdtime in seconds (range 0...4294967295 sec).

```
[admin@CRT861]$ help vsahold

Usage: vsahold [HOLDTIME]

Display or set the video source alarm holdtime.
Holdtime defines how long will a missing video signal be tolerated
before enabling the alarm.

        HOLDTIME       Holdtime in seconds.

[admin@CRT861]$
```

TFTP, Trivial File Transfer Protocol

TFTP is a simple protocol used for updating the software on network devices. This server application can be used in the same PC which is used for the CFO management. Suitable TFTP application softwares are freely available from verious internet sources.

Technical specifications CFO161/191/461/491/861/891

Optical

Wavelength	1310/1310 nm 1550/1310 nm	CFOx61 CFOx91	
Output power	-1 dBm +1 dBm	CFOx61 CFOx91	
Received power Received power	-21 dBm -23 dBm	CFOx61 CFOx91	min. min.

Video

Number of channels	1 uni-directional 4 uni-directional 8 uni-directional	CFO161/191 CFO461/491 CFO861/891
Standard	CVBS CVBS or Y/C	CFO161/191 CFO461/491/861/891
Input and output signal levels	1 Vp-p	
Input overload level	1.5 Vp-p	DC component
Impedance	75 ohm	
Sampling	10 bits / 15.55 MHz	
Bandwidth	6.5 MHz	- 3 dB
C/L gain inequality	3 %	
C/L delay inequality	40 ns	max
Differential gain	2 %	max
Differential phase	2°	max
S/N ratio	67 dB	unified, weighted

Data

Number of channels	3 bi-directional	
Data 1 & 2 format	RS232/422/485	selectable
Data 3 format	RS232	fixed
Data rate	0...230 kbps	all channels
Dwelltime setting	50...10000 µs	RS485 2-wire

Audio

Number of channels	2 bi-directional	unbalanced / balanced
Sampling frequency	60.5 kHz	
Sampling resolution	16 bits	
Input impedance	600/10k ohm	selectable
Output impedance	10 ohm	
Nominal level	0 dBm	
Clipping level	+20 dBm	
Frequency response	0.02...20 kHz	- 3 dB, ref. 1 kHz
S/N ratio	70 dBqp	CCIR weighted

Contact Closure

Number of channels	1 bi-directional	
Input	dry contact	open/close, max loop R 120 ohm
Output	relay	max 30 V/1A switching
Data rate	5 Hz	max

Ethernet Bridge

Number of ports	1 bi-directional	
Port type	10/100Base-TX	configurable
Compliant	IEEE802.3, IEEE802.3U	

Management

Command Line Interface	RS-232 and/or TCP/IP terminal
SNMP	v2, MIB-II, remote via network

General

Supply voltage	10.5...14 V DC	regulated
Current consumption (max)	750 mA	steady state
Dimensions (H x W x D)*	3U • 10HP • 190 mm 3U • 15HP • 190 mm	CFO161/191/461/491 CFO861/891
Weight	0.8 kg 0.9 kg	CFO161/191 CFO461/491/861/891

Connectors

Video	BNC female	
Data/audio/cc/mgmt/Ethernet	RJ-45 female	
Optical	SC/APC 8°	angle-polished only

Environmental

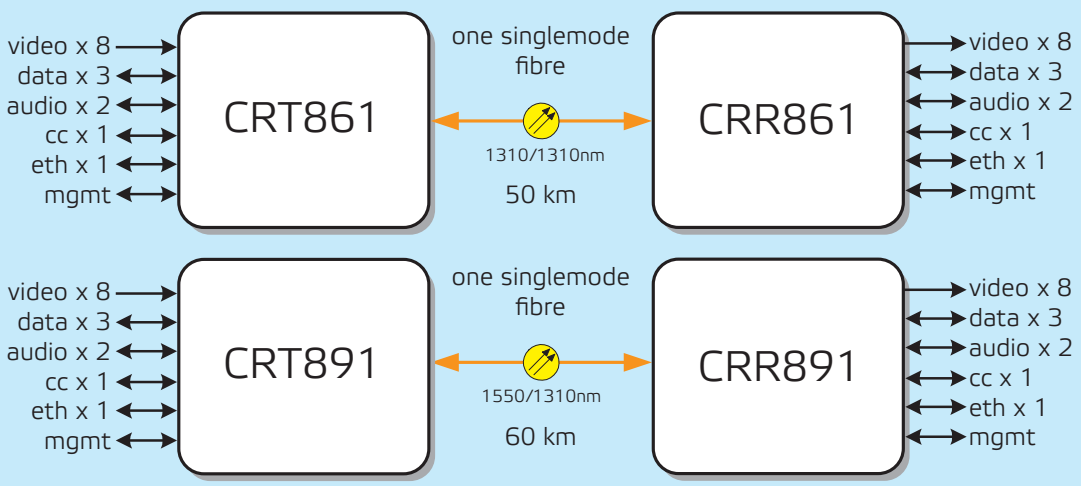
Operating temperature	-34...+74 °C	
Storage temperature	-34...+74 °C	
Humidity	0...95 %	non condensing
EMC compatibility	EN61000-6-4, EN50130-4, CE FCC CFR 47 Part 15 (subpart B, class A)	

Notes

Class 1M Laser Product

* without CMA

Typical values unless otherwise stated



Technical specifications CFO432

Optical		
Wavelength [1]	1310 nm 1310 nm	forward return
Range [2]	1.5 km 2.5 km	OM1 (62.5/125 µm) OM2 (50/125 µm)

Video		
Number of channels	4 uni-directional	
Standard	CVBS or Y/C	
Input and output signal levels	1 Vp-p	
Input overload level	1.5 Vp-p	DC component
Impedance	75 ohm	
Sampling	10 bits / 15.55 MHz	
Bandwidth	6.5 MHz	- 3 dB
C/L gain inequality	3 %	
C/L delay inequality	40 ns	max
Differential gain	2 %	max
Differential phase	2°	max
S/N ratio	67 dB	unified, weighted

Data		
Number of channels	3 bi-directional	
Data 1 & 2 format	RS232/422/485	selectable
Data 3 format	RS232	fixed
Data rate	0...230 kbps	all channels
Dwelltime setting	50...65500 µs	RS485 2-wire

Audio		
Number of channels	2 bi-directional	unbalanced / balanced
Sampling frequency	60.5 kHz	
Sampling resolution	16 bits	
Input impedance	600/10k ohm	selectable
Output impedance	10 ohm	
Nominal level	0 dBm	
Clipping level	+20 dBm	
Frequency response	0.02...20 kHz	- 3 dB, ref. 1 kHz
S/N ratio	70 dBqp	CCIR weighted

Contact Closure		
Number of channels	1 bi-directional	
Input	dry contact	open/close, max loop R 120 ohm
Output	relay	max 30 V/1A switching
Data rate	5 Hz	max

Ethernet Bridge		
Number of ports	1 bi-directional	
Port type	10/100Base-TX	configurable
Compliant	IEEE802.3, IEEE802.3U	

Management	
Command Line Interface	RS-232 and/or TCP/IP terminal
SNMP	v2, MIB-II, remote via network

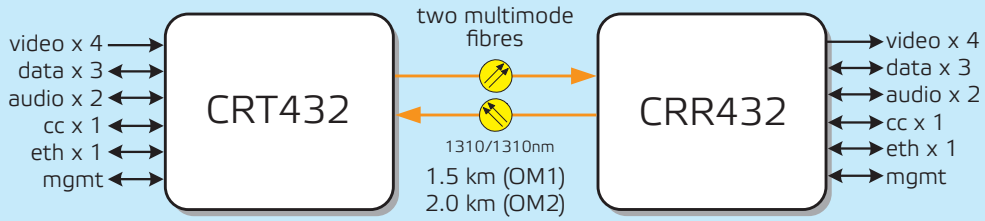
General		
Supply voltage	10.5...14 V DC	regulated
Current consumption (max)	750 mA	steady state
Dimensions (H x W x D)	3U x 10HP x 190 mm	without CMA
Weight	0.8 kg	
Connectors		
Video	BNC female	
Data/audio/cc/mgmt/Ethernet	RJ-45 female	
Optical	LC/UPC	
Operating temperature	-34...+74 °C	
Storage temperature	-34...+74 °C	
Humidity	0...95 %	non condensing
EMC compatibility	EN61000-6-4, EN50130-4, CE FCC CFR 47 Part 15 (subpart B, class A)	

Notes

[1] Class 1M operation.

[2] Transmission distance may be limited by fibre type (bandwidth) and possible other physical variables on the cable infrastructure.

Typical values unless otherwise stated



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WEEE directive

Directive 2002/96/EC of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE) obliges that producers appropriately mark electrical and electronic equipment with the symbol indicating separate collection. This obligation applies to the equipment put on the market in EU after 13 August 2005.

Teleste devices which belong to the scope of the directive have been marked with the separate collection symbol shown below. The marking is according to the standard EN 50419. The symbol indicates that the device has to be collected and treated separately from unsorted municipal waste.

User manual revision history note:
The latest version is always available in pdf-format on our web site:
www.teleste.com

Notes

TELESTE

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